ACADEMY OF HEALTH SCIENCES *M MTN9-C9B-1
DEPARTMENT OF MEDICAL SCIENCES 1101
PHYSICAL THERAPY BRANCH

Introduction to the Nervous System

References:

Barr, Murray L. And Kiernan, John A. The Human Nervous System. 5th ed. Philadelphia: J.B. Lippincott Co., 1988.

Goldberg, Stephen. Clinical Neuroanatomy made ridiculously simple. Miami: MedMaster, Inc., 1990.

Landau, Barbara R. Essential Human Anatomy and Physiology. 2nd ed. Glenview, Illinois: Scoot, Foresman and Co., 1980.

Tortora, Gerald J. and Grabowski, S.R. Principles of Anatomy and Physiology, 9th ed., New York: Harper and Row, 2000.

Objectives:

1. Terminal Learning Objective:

   Given a list, select the anatomic components and function(s) of the central nervous system and peripheral nervous system, and match the system with its function and/or component IAW Tortora.

2. Enabling Learning Objectives:

   a. Given a list, select the two major divisions of the human nervous system IAW Tortora.

   b. Given a list, select the anatomical structures of the central nervous system and the peripheral nervous system IAW Tortora.

   c. Given a list, select the two types of the cranial and spinal nerves IAW Tortora.

   d. Given a list, select the function of the somatic nervous system and autonomic nervous system IAW Tortora.

   e. Given a list, select the two main types of cells of the nervous system IAW Tortora.

   f. Given a list, select the location(s) of the neuroglia and the neurons IAW Tortora.

   g. Given a list, select the function(s) of the different types neuroglia cells IAW Tortora.

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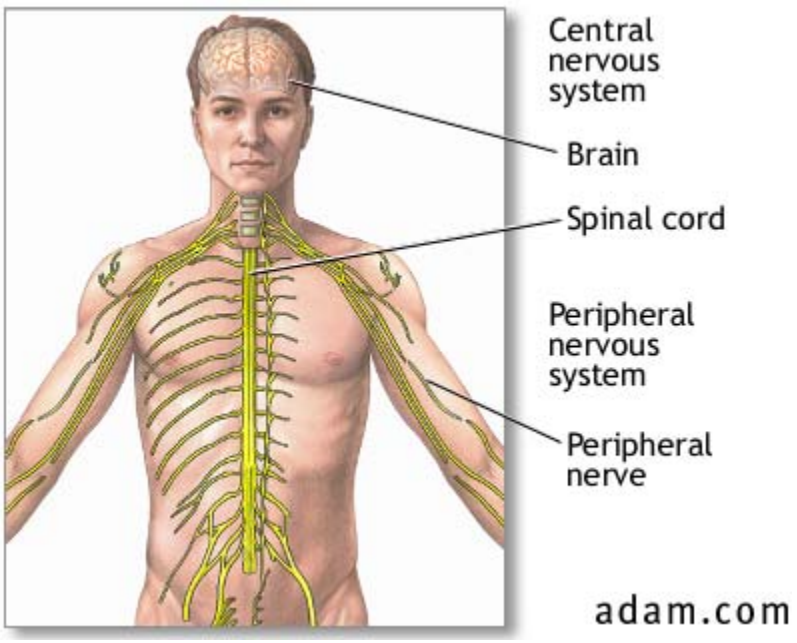
NOTES

A. Organization of the Human Nervous System.



1. Principle Divisions

   a. **Central** nervous system (CNS)

      1) Control center for entire nervous system

      2) Brain & spinal cord

   b. **Peripheral** nervous system (PNS)

      1) Connects receptors, muscles and glands with the central nervous system

      2) Nerves exiting the brain (**Cranial nerves** - 12 pairs) and spinal cord (**spinal nerves -** 31 pairs)

         a) **Afferent** system - (Sensory) nerves that convey information from receptors within the skin, skeletal muscle or an organ to the central nervous system

b) **Efferent** system - (motor) nerves that convey information from the central nervous system to the muscles (skeletal, smooth or cardiac) and glands

(1) **Somatic** nervous system - efferent neurons that conduct impulses to skeletal muscle tissue, under conscious control = **voluntary**

(2) **Autonomic** nervous system - efferent neurons that conduct impulses to smooth muscle tissue, cardiac muscle tissue and glands, not under conscious control = **involuntary**

(a) **Sympathetic division** - generally stimulates an organ's activity

(b) **Parasympathetic division** - generally inhibits an organ's activity

B. Cells of the Nervous System

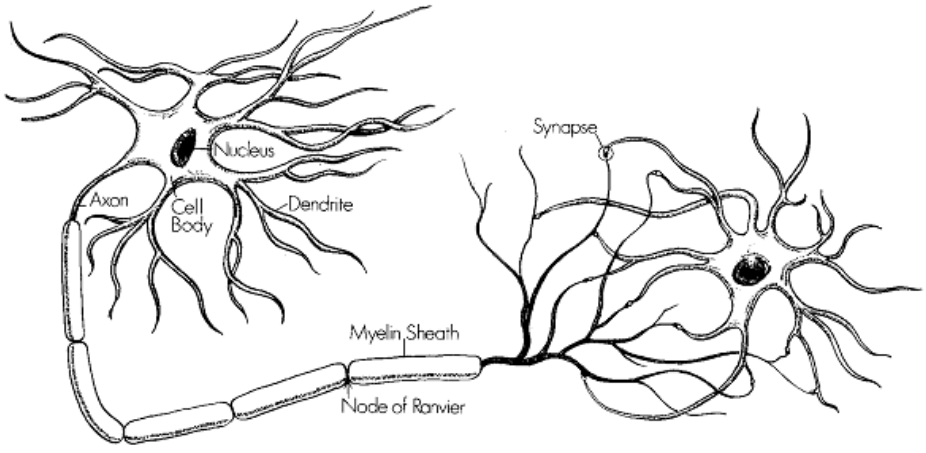
1. **Neuron**

a. A nerve cell, the structural and functional unit of the nervous system, a specialized cell consisting of a cell body, dendrites and an axon.

b. Responds to nerve impulses of other neurons by initiating & transmitting one or more impulses - Conduction

1) Conduct information to & from central nervous system

2) Conduct information within the central nervous system



2. **Neuroglia**

    a. Supports and protects the neurons of the **central nervous system**

    b. Different types of neuroglia and their functions:

        1) **Astrocytes**

            a) Star-shaped

            b) Twine around neurons to form a supporting network & attach neurons to blood vessels.

        2) **Oligodendrocytes**

            a) Similar, but smaller, in appearance to astrocytes

            b) Form the myelin sheath for neurons in the CNS

        3) **Microglia**

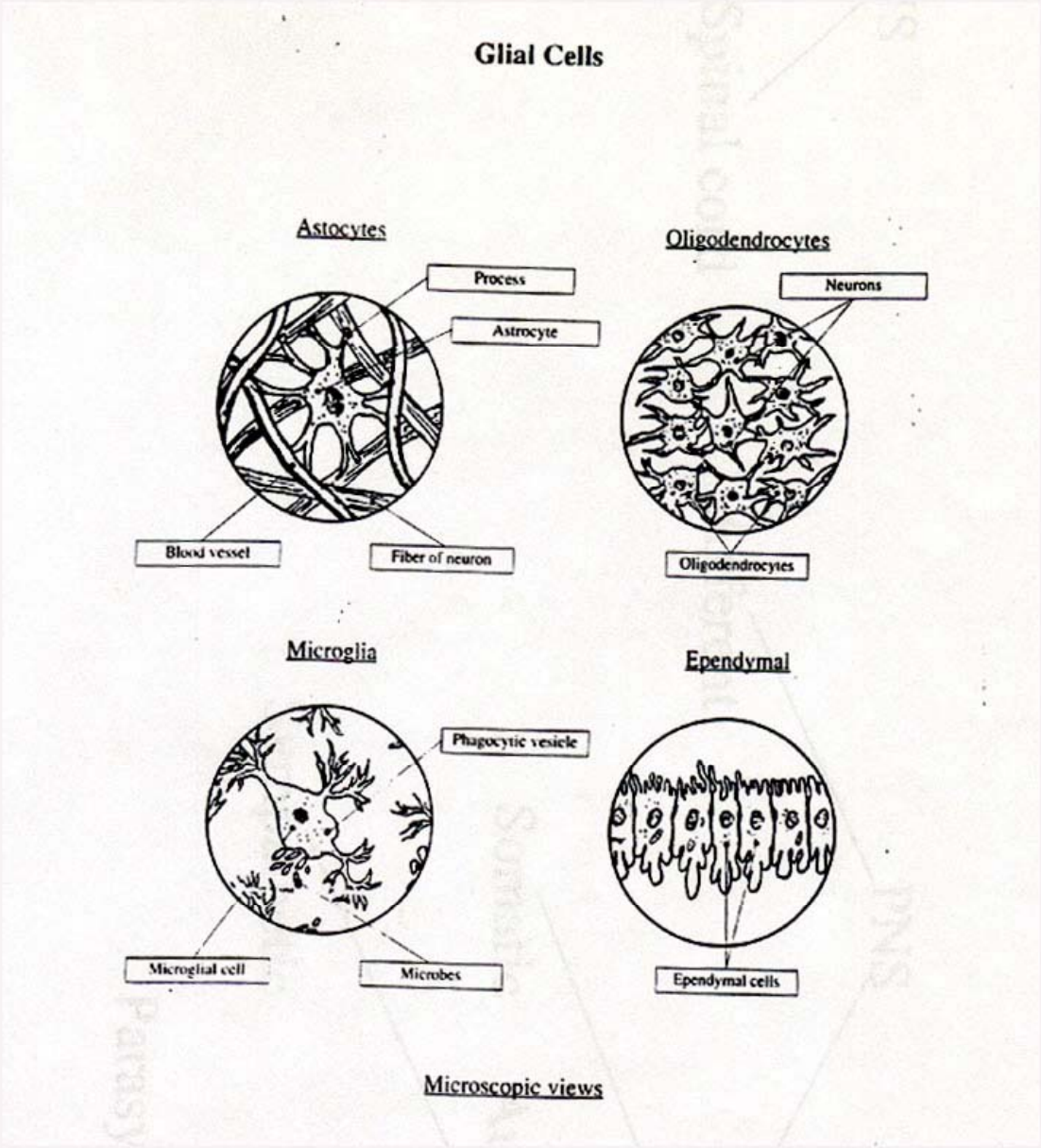
            a) Derived from monocytes, small in size

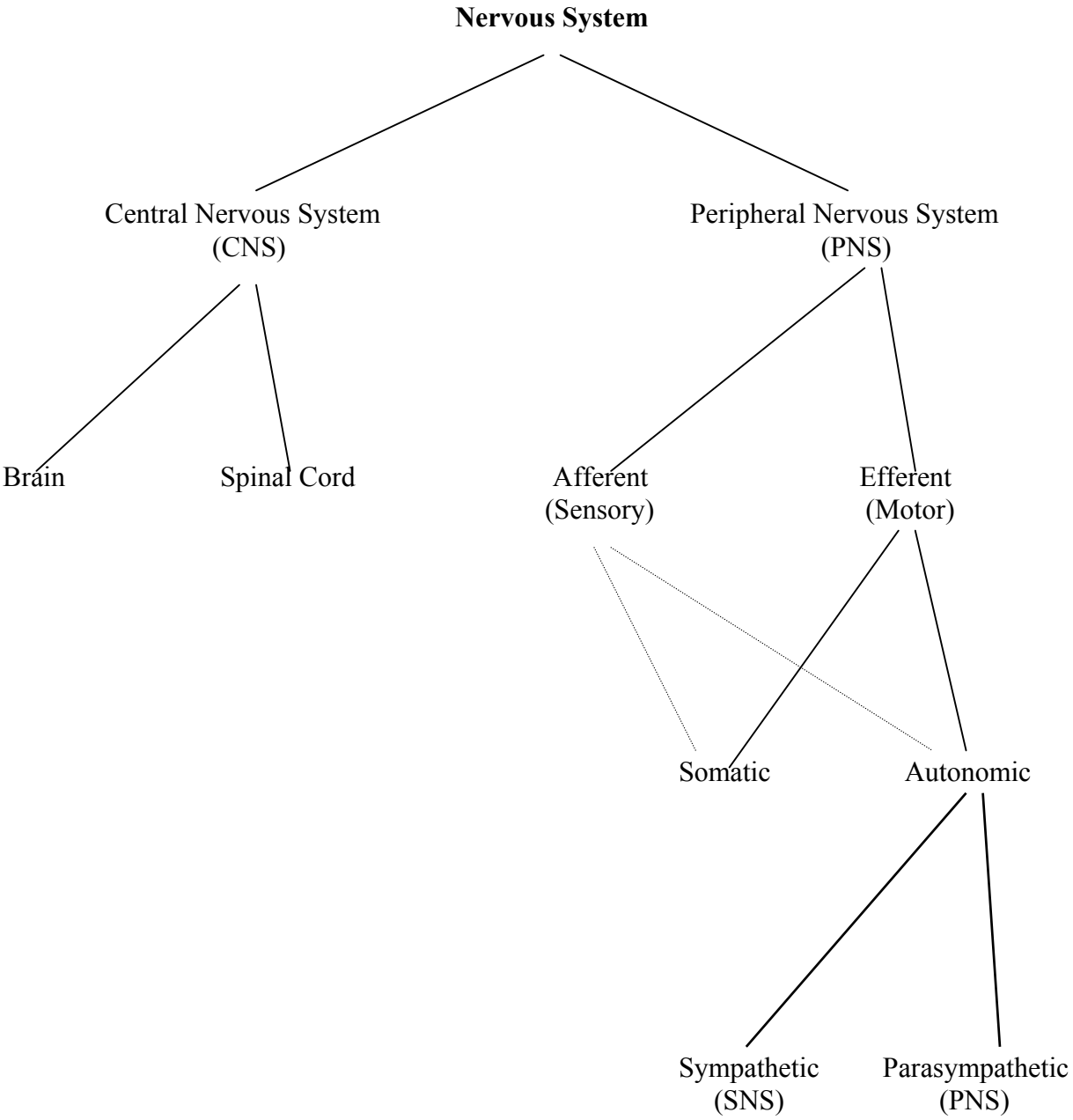
            b) Consume waste products and protect the neurons of the CNS by phagocytosis of microbes and debris

        4) **Ependyma**

            a) Epithelial cells

            b) Line the ventricles of the brain and the central canal


Glial Cells
Astocytes
Process
Astrocyte
Blood vessel
Fiber of neuron
Oligodendrocytes
Neurons
Oligodendrocytes
Microglia
Phagocytic vesicle
Microglial cell
Microbes
Ependymal
Ependymal cells
Microscopic views


Nervous System
Central Nervous System (CNS)
Peripheral Nervous System (PNS)
Brain
Spinal Cord
Afferent (Sensory)
Efferent (Motor)
Somatic
Autonomic
Sympathetic (SNS)
Parasympathetic (PNS)